Phytoplankton carbon biomass in Gruz and Mali Ston Bays (Southern Adriatic)

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According to the annual phytovolume distribution, the Gruz (N 42°52', E 17°40') and Mali Ston (N 42°40', E 18°05') Bays have been included in the same category of moderately eutrophicated ecosystem (VILICIC, 1989), but those bays have different eutrophication sources. Most of the eutrophication in the Mali Ston Bay is caused by washing of nutrient salts from surrounding sediments, whereas in the Gruz Bay, both natural and anthropogenous eutrophication sources abound. Fresh waters from the Ombla river and sewage waters enrich the Gruz Bay with nutrients, whereas open sea waters frequently influence near the bottom layer. This paper compares phytoplankton carbon biomass values between the two bays.

Phytoplankton in the Gruz (Gruz station, 25 m max. depth) and Mali Ston Bays (Usko station, 12 m max. depth) was sampled from February 1988 to February 1989. Phytoplankton samples were preserved with 2% neutralized formaldehyde solution, and their cell counts were obtained by the inverted microscope method (UTERMOHL, 1958). Total cell volume was calculated from cell density and cell volume data of each species, according to SMAYDA (1978). Phytoplankton biomass in terms of carbon content was estimated from total cell volume according to EPPLEY *et al.* (1970). Physical-chemical parameters were determined by standard oceanographic methods (STRICKLAND and PARSONS, 1972).

Annual distribution of total phytoplankton carbon biomass in the Gruz and Mali Ston Bays is represented in Fig. 1. An intense development of the total phytoplankton biomass was registered in the spring-summer period. Temporal distribution of the microplankton (>20µm) and nanoplankton (<20µm) biomass matches seasonal rhythms characteristic of coastal eastern Adriatic waters. Considerable differences were observed in range, maximum and mean annual microplankton, nanoplankton and total phytoplankton biomass (Table 1). Seasonal fluctuations were even more pronounced in the Gruz Bay, where the maximum annual value tripled the values for Mali Ston Bay, and were caused by a more intensive exchange between sewage and the open sea waters. Therefore, when compared to Gruz Bay, Mali Ston Bay is the area of greater ecological stability, in spite of high salinity values and fluctuations in nutrient salts. The Gruz Bay maximum annual nutrient concentration was recorded in April and was caused by fresh water influx from the river Ombla. An intensive development of dinoflagellate *Prorocentrum triestinum* was recorded (119 µg C/l) in May. In both bays, seasonal fluctuations in nanoplankton carbon biomass were less pronounced than in microplankton. The contribution of nanoplankton to total phytoplankton carbon biomass ranged from 53 to 96% in the Gruz Bay, and 36 to 85% in the Mali Ston Bay. The relative contribution of microplankton to the total phytoplankton biomass in the Mali Ston Bay exceeded that of nanoplankton only in March, when the maximum annual microplankton biomass was recorded, and to which the species *Chaetoceros compressus* and *Rhizosolenia stolterfothii* contributed the most. According to frequency distribution data, nanoplankton biomass values mostly ranged from 10-15 µg C/l, and total phytoplankton from 15-20 µg C/l in both bays. Maximum microplankton carbon biomass frequency in the Gruz Bay ranged from 0-1 µg C/l, whereas in the Mali Ston Bay, it ranged from 3-4 µg C/l. Those differences between the bays confirm the prevailing influence of the open sea waters in the Gruz Bay.

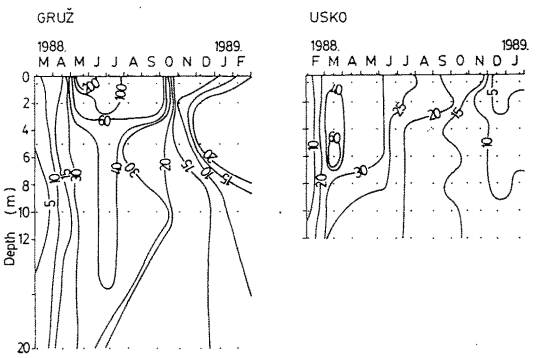

Fig. 1. Distribution of the total phytoplankton carbon biomass (µg C/l) in the Gruz and Mali Ston Bays.

Tab. 1. Temperature (T), salinity (S) and microplanklon (M), nanoplankton (N) and total phytoplankton carbon biomass in the Gruz and Mali Ston Bays.

	Gruz Bay (n=46)			Mali Ston Bay (n=83)		
	Range	Mean	SD	Range	Mean	SD
T (°C)	12.9 - 26.1			9.5 -26.8		
S x 10^3	26.55- 38.66			28.31-38.87		
M (µg C/l)	0.11-168.59	9.47*	28.11	0.24-55.23	6.28*	7.81
N (µg C/l)	2.61- 78.03	24.74*	17.54	2.79-29.5	12.25*	6.07
Total (µg C/l)	3.07-246.62	33.94*	42.56	5.01-64.32	18.53*	9.89

Means at the same line followed by * are significantly different (P<0.001, Student's t-test), SD = standard deviation

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